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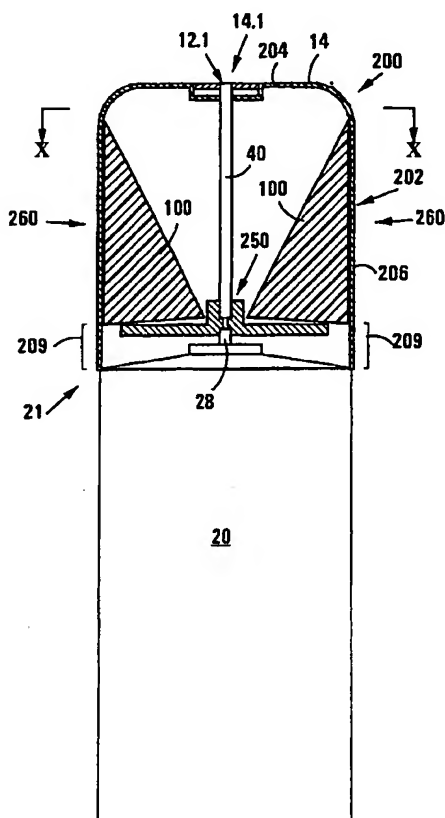
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(54) Title: A VALVE ACTUATOR



(57) Abstract: The invention provides a valve actuator (200) for mounting on a pressurized container (20). The actuator includes conversion means (100) for converting an applied pressure to an actuating pressure in a transverse direction to the applied pressure for actuating a valve of the container. The invention also provides a dispensing device which includes a reservoir for holding contents to be dispensed under pressure and a valve for controlling dispensing from the reservoir.

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— Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A VALVE ACTUATOR

THIS INVENTION relates to valves. In particular it relates to a valve actuator. It also relates to a dispensing device.

According to one aspect of the invention, there is provided
5 a valve actuator for mounting on a pressurised container, the actuator including conversion means for converting an applied pressure to an actuating pressure in a transverse direction to the applied pressure for actuating a valve of the container.

According to another aspect of the invention, there is
10 provided a dispensing container, which includes
a reservoir for holding contents to be dispensed under pressure;
a valve for controlling dispensing from the reservoir; and
a valve actuator for actuating the valve, the valve actuator including conversion means for converting an applied pressure to an
15 actuating pressure in a transverse direction to the applied pressure for actuating the valve of the container.

Typically, the reservoir is defined by the body of an aerosol can.

The conversion means may include
20 an actuator seat which is receivable on the valve; and

at least one bearing component which is adjustable into an operative condition, in which it converts the applied pressure to the actuating pressure via the seat thereby to actuate the valve.

5 The valve actuator may include a housing for housing the conversion means. At least part of the housing may be of a resiliently deformable material so that when the applied pressure is applied laterally to a side of the housing, the or each bearing component is adjusted into its operative condition.

10 The housing may define mounting means shaped and dimensioned to be received on an end of the container proximate its valve in a snap-fit fashion. Typically, the mounting means is received on the top of the body of the aerosol can.

15 The bearing component may be of a resiliently deformable material which defines a bearing surface which in the operative condition bears against and displaces the seat upon application of the lateral pressure.

20 The bearing component may be of a rigid material and may define a bearing surface. The bearing component may be mounted within the housing so that it is pivotally adjustable into the operative condition in which it bears against and displaces the seat upon application of the lateral pressure thereby to actuate the valve.

The housing may include a plurality of rigid sections interconnected by resiliently deformable sections. The bearing components are typically supported by the rigid sections.

5 The housing may include a zone of reduced rigidity proximate the mounting means. The rigid sections may be pivotally displaceable about the zone of reduced rigidity when the lateral pressure is applied. Typically, the housing is cylindrical, the rigid sections then being pivotally displaceable radially inwardly.

10 The bearing components may be dimensioned to include a working arm which bears against the seat, and an effort arm to which the laterally applied pressure is applied, the effort arm being longer than the working arm to obtain a mechanical advantage.

15 The bearing components may be rotatable between an operative position in which they are aligned for abutment against the seat for dispensing from the container, and an inoperative position in which they are out of register with the seat to prevent dispensing.

20 The seat may include a socket shaped and dimensioned to receive a valve stem of the valve thereby to mount the seat to the valve stem for actuating the valve, the seat including a flow passage to allow discharge of contents from the container via its valve stem.

The seat may be snugly, e.g. by way of a friction fit, mounted to the valve stem and the mounting means may movably mount the housing to the container so that, upon rotation of the housing

relative to the container, the bearing components are rotated between their operative and inoperative positions.

5 The valve actuator may include a discharge outlet mounted proximate an upper end of the housing distal from the seat, and a connecting tube connectable to the flow passage of the seat for discharging contents of the container upon actuation from the valve stem to the discharge outlet by the laterally applied pressure.

The invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings.

10 In the drawings,

Figure 1 shows an axial section through a valve actuator, in accordance with the invention, mounted on top of an aerosol can, the actuator being in a non-dispensing condition;

15 Figure 2 shows a three-dimensional view of an actuator seat of the actuator of Figure 1;

Figure 3 shows three-dimensional views of a bearing component of the actuator of Figure 1;

20 Figure 4 shows a three-dimensional view of another embodiment of a bearing component which may replace the bearing component of Figure 3;

Figure 5 shows the actuator of Figure 1 in an operative or dispensing condition;

Figure 6 shows a bottom plan view of the actuator of Figure 1 removed from the aerosol can;

Figure 7 shows a top plan view of the actuator of Figure 1 taken at VII-VII in Figure 1;

Figure 8 shows an axial section through a further embodiment of an actuator, also in accordance with the invention, mounted on the top of an aerosol can;

Figure 9 shows a three-dimensional view of an actuator seat of the actuator of Figure 8;

Figure 10 shows a sectional view taken at X-X in Figure 8 with the actuator in its operative or dispensing condition; and

Figure 11 shows a sectional view corresponding with Figure 10 with the actuator in its inoperative or non-dispensing condition.

Referring to Figure 1 of the drawings, reference numeral 10 generally indicates a valve actuator in accordance with the invention. The actuator 10 includes a cylindrical housing or body 12 having a circular top 14 and a cylindrical side wall 16. In the embodiment depicted in the drawings, the top 14 is integrally formed with the side wall 16. However, in other embodiments, the top 14 can be removed. The actuator 10 is detachably mounted on top of a pressurised container in the form of a conventional aerosol can 20 by snap-fit mounting means 21.

The actuator 10 includes an actuator seat 30 which is mounted to a conventional valve control stem 28 of the valve of the aerosol can 20. The seat 30 includes a circular base 32 (see Figures 1 and 2) and a raised circular top 34 of narrower cross-section which is integrally formed with the circular base 32 from a synthetic plastics material. The base 32 has a socket 32.1 which is shaped and

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dimensioned snugly to receive an end of the control stem 28. The top 34 has a socket 34.1 for receiving an end of an elongate tube 40 of the actuator 10. An axial passage 39 extends between the sockets 32.1 and 34.1 so that the tube 40 and the valve stem 28 are in flow communication. The tube 40 leads to a discharge opening 12.1 in the top 14 of the body 12 from which the contents of the can 20 is selectively discharged. A portion 14.1 of the top 14 immediately adjacent the opening 12.1 is reinforced.

The actuator 10 further includes six peripherally spaced fins or bearing components 50 (see Figures 1, 3, 6 and 7) mounted within the cylindrical body or housing 12. Each bearing component 50 has a top 50.1, a bottom 50.2 and sides 50.3, 50.4 extending between the top 50.1 and bottom 50.2 (see Figures 1, 3, 5 and 6). The top 50.1 and bottom 50.2 are wedge shaped and the side 50.3 has an arcuate shape to seat against the cylindrical side wall 16. The sides 50.4 are trapezoidal in shape. The bottom 50.2 of each bearing component 50 slopes downwardly towards the seat 30 and bears against an annular shoulder or flange 37 (see Figure 2) of the actuator seat 30. The sides 50.3 of the bearing components 50 are in contact with the cylindrical side wall 16. The angular spacing between bearing components 50 is the same.

Referring to Figure 4 of the drawings, reference numeral 100 generally indicates a further embodiment of a bearing component forming part of an actuator in accordance with the invention. The bearing component 100 has a wedge shaped top 102 and a wedge

shaped bottom 104. Two rectangular sides 106 extend between the top 102 and the bottom 104. An arcuate side 108 extends between the top 102 and the bottom 104 and is parallel to and seats against the cylindrical side wall 16, in use. In certain embodiments of the actuator 10, the bearing component 100 replaces the bearing component 50. Both the bearing components 50, 100 and the cylindrical body or housing 12 are made of a resiliently deformable plastics material.

In use, a laterally applied finger pressure is applied to the cylindrical body or housing 12 in the direction of arrows 60 (see Figure 1 and 5) and, as a result thereof, the bearing components 50 to which the pressure is applied are adjusted or deformed to an operative condition in which the bottom 50.2, 104 of the components are displaced downwardly in the direction of arrows 70. This causes the bearing components 50 to bear against the annular shoulder 37 (see Figure 2) of the actuator seat 30 thereby causing the seat 30 to be displaced towards a body of the can 20 and, accordingly, the valve stem 28 is depressed. The valve mechanism 41 of the aerosol can 20 is thereby actuated and the contents of the aerosol can 20 is conveyed through the passage 39 of the seat 30 into the tube 40 and discharged via the opening 12.1, as shown in Figure 5. The bottoms 50.2, 104 thus define bearing surfaces which are longitudinally displaceable to bear against the seat 30 upon transverse deformation of the body or housing 12. A laterally applied pressure is thus converted by conversion means including the bearing components 50 and the seat 30, into an actuating pressure which actuates the valve mechanism 51. Although the bearing components 50, 100 have been described as being resiliently deformable, it is to be appreciated that they may be rigid and may pivot

inwardly under finger or hand pressure into the operative condition described above.

Referring to Figures 8 to 11 of the drawings, reference numeral 200 generally indicates another embodiment of a valve actuator
5 in accordance with the invention.

The actuator 200 includes a cylindrical body or housing 202 having a circular top 204 and a cylindrical side wall 206. The side wall 206 has longitudinally extending rigid sections 208 (see Figure 10) of a rigid or hard plastics material which alternate with longitudinally
10 extending sections 210 of a resiliently deformable plastics material. The rigid sections 208 are designed to bend in a circular zone or band of reduced rigidity 209 (see Figure 8) of the body or housing 202 when subjected to lateral pressure as will be described in detail below. The actuator 200 includes bearing components 100 (see Figure 4) which are
15 integrally formed with and hence supported by the rigid sections 208.

The actuator 200 includes an actuator seat 250 which is similar to the seat 30 except that its solid flange 37 has been replaced by a number of arcuately spaced arms 252 (see Figure 9) which extend radially outwardly from its top 34. Spaces 254 between the arms 252,
20 are of a complementary shape to the bottoms 104 of the bearing component 100. The actuator 200 is mounted on the aerosol can 20 for rotation between an operative condition or dispensing position and an inoperative condition or non-dispensing position.

In the dispensing position (see Figure 10 of the drawings), the bottoms 104 of the bearing components 100 are in register with the arms 252. In this position lateral finger pressure or hand pressure, applied to two opposed sections 208, in the direction of arrows 260 (see Figure 8 of the drawings), results in the sections 208 bending inwardly about the region 209 in a pivoting fashion. As a result the bearing components 100 are pivotally adjusted into an operative condition in which the bottoms 104 bear against the arms 252. This causes the actuator seat 250 to be displaced towards the body of the can 20 thereby to discharge the contents of the aerosol can 20, as described above. The arms 252 thus define shoulders against which the bottoms 104 bear, in use.

In the non-dispensing position, the bottoms 104 are aligned with the spaces 254 between the arms 252. It will be appreciated that in the non-dispensing position (see Figure 11 of the drawings) lateral finger pressure displaces the arms 252 between the shoulders and, accordingly actuation of the valve of the aerosol can 20 is avoided.

The Inventor believes that it is an advantage of the invention, as illustrated, that it provides a valve actuator 10 which facilitates the actuation of a valve on an aerosol can 20. In particular, persons who have difficulty in actuating conventional valve actuators, which are smaller and require pressure to be applied to the actuator by a single finger, may apply pressure to the actuator 10 thereby facilitating actuation of the can 20.

CLAIMS:

1. A valve actuator for mounting on a pressurised container, the actuator including conversion means for converting an applied pressure to an actuating pressure in a transverse direction to the applied pressure for actuating a valve of the container.
- 5
2. A valve actuator as claimed in Claim 1, in which the conversion means includes
- an actuator seat which is receivable on the valve; and
- at least one bearing component which is adjustable into an operative condition, in which it converts the applied pressure to the actuating pressure via the seat thereby to actuate the valve.
- 10
3. A valve actuator as claimed in Claim 2, which includes a housing for housing the conversion means, at least part of the housing being of a resiliently deformable material so that when the applied pressure is applied laterally to a side of the housing, the or each bearing component is adjusted into its operative condition.
- 15
4. A valve actuator as claimed in Claim 3, in which the housing defines mounting means shaped and dimensioned to be received on an end of the container proximate its valve in a snap-fit fashion.
- 20
5. A valve actuator as claimed in Claim 3 or Claim 4, in which the bearing component is of a resiliently deformable material which

defines a bearing surface which in the operative condition bears against and displaces the seat upon application of the lateral pressure.

- 5 6. A valve actuator as claimed in Claim 3 or Claim 4, in which the bearing component is of a rigid material and defines a bearing surface, the bearing component being mounted within the housing so that it is pivotally adjustable into the operative condition in which it bears against and displaces the seat upon application of the lateral pressure thereby to actuate the valve.
- 10 7. A valve actuator as claimed in Claim 6, in which the housing includes a plurality of rigid sections interconnected by resiliently deformable sections, the bearing components being supported by the rigid sections.
- 15 8. A valve actuator as claimed in Claim 7, in which the housing includes a zone of reduced rigidity proximate the mounting means, the rigid sections being pivotally displaceable about the zone of reduced rigidity when the lateral pressure is applied.
- 20 9. A valve actuator as claimed in Claim 8, in which the bearing components are dimensioned to include a working arm which bears against the seat, and an effort arm to which the laterally applied pressure is applied, the effort arm being longer than the working arm to obtain a mechanical advantage.
10. A valve actuator as claimed in any one of the preceding Claims 4 to 9 inclusive, in which bearing components are rotatable

relative to the seat between an operative position in which they are aligned for abutment against the seat for dispensing from the container, and an inoperative position in which they are out of register with the seat to prevent dispensing.

- 5 11. A valve actuator as claimed in Claim 10, in which the seat includes a socket shaped and dimensioned to receive a valve stem of the valve thereby to mount the seat to the valve stem for actuating the valve, the seat including a flow passage to allow discharge of contents from the container via its valve stem.
- 10 12. A valve actuator as claimed in Claim 11, in which the seat is snugly mounted to the valve stem and the mounting means movably mounts the housing to the container so that, upon rotation of the housing relative to the container, the bearing components are rotated between their operative and inoperative positions.
- 15 13. A valve actuator as claimed in Claim 11 or Claim 12, which includes a discharge outlet mounted proximate an upper end of the housing distal from the seat, and a connecting tube connectable to the flow passage of the seat for discharging contents of the container upon actuation from the valve stem to the discharge outlet by the laterally
20 applied pressure.
14. A dispensing device, which includes
 a reservoir for holding contents to be dispensed under pressure;
 a valve for controlling dispensing from the reservoir; and

a valve actuator for actuating the valve, the valve actuator including conversion means for converting an applied pressure to an actuating pressure in a transverse direction to the applied pressure for actuating the valve of the container.

5 15. A device as claimed in Claim 14, in which the conversion means includes

an actuator seat which is receivable on the valve; and

10 at least one bearing component which is adjustable into an operative condition in which it converts the applied pressure to the actuating pressure via the seat thereby to actuate the valve.

15 16. A device as claimed in Claim 15, which includes a housing for housing the conversion means, at least part of the housing being of a resiliently deformable material so that when the applied pressure is applied laterally to a side of the housing, the or each bearing component is adjusted into its operative condition.

17. A device as claimed in Claim 16, in which the housing defines mounting means shaped and dimensioned to be received on an end of the container proximate its valve in a snap-fit fashion.

20 18. A device as claimed in Claim 16 or Claim 17, in which the bearing component is of a resiliently deformable material which defines a bearing surface which in the operative condition bears against and displaces the seat upon application of the lateral pressure.

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19. A device as claimed in Claim 16 or Claim 17, in which the bearing component is of a rigid material and defines a bearing surface, the bearing component being mounted within the housing so that it is pivotally adjustable into the operative condition in which it bears against and displaces the seat upon application of the lateral pressure thereby to actuate the valve.

20. A device as claimed in Claim 19, in which the housing includes a plurality of rigid sections interconnected by resiliently deformable sections, the bearing components being supported by the rigid sections.

21. A device as claimed in Claim 20, in which the housing includes a zone of reduced rigidity proximate the mounting means, the rigid sections being pivotally displaceable about the zone of reduced rigidity when the lateral pressure is applied.

22. A device as claimed in Claim 21, in which the bearing components are dimensioned to include a working arm which bears against the seat, and an effort arm to which the laterally applied pressure is applied, the effort arm being longer than the working arm to obtain a mechanical advantage.

23. A device as claimed in any one of the preceding Claims 17 to 22 inclusive, in which bearing components are rotatable between an operative position in which they are aligned for abutment against the seat for dispensing from the container, and an inoperative position in which they are out of register with the seat to prevent dispensing.

24. A device as claimed in Claim 23, in which the seat includes a socket shaped and dimensioned to receive a valve stem of the valve thereby to mount the seat to the valve stem for actuating the valve, the seat including a flow passage to allow discharge of contents from the container via its valve stem.

25. A device as claimed in Claim 24, in which the seat is snugly mounted to the valve stem and the mounting means movably mounts the housing to the container so that, upon rotation of the housing relative to the container, the bearing components are rotated between their operative and inoperative positions.

26. A device as claimed in Claim 24 or Claim 25, which includes a discharge outlet mounted proximate an upper end of the housing distal from the seat, and a connecting tube connectable to the flow passage of the seat for discharging contents of the container upon actuation from the valve stem to the discharge outlet by the laterally applied pressure.

27. A new valve actuator, substantially as herein described and illustrated.

28. A new dispensing device, substantially as herein described and illustrated.

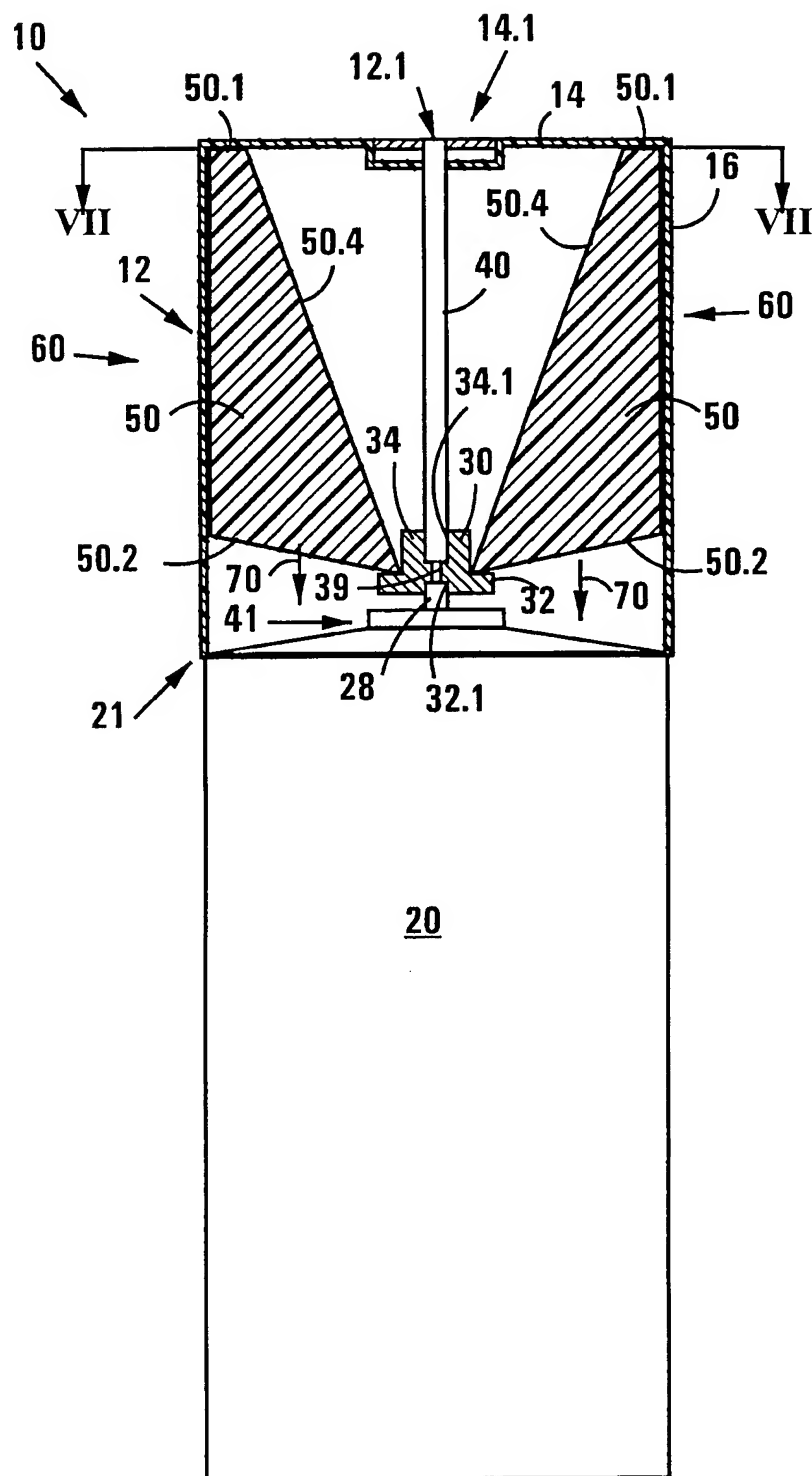


FIG 1

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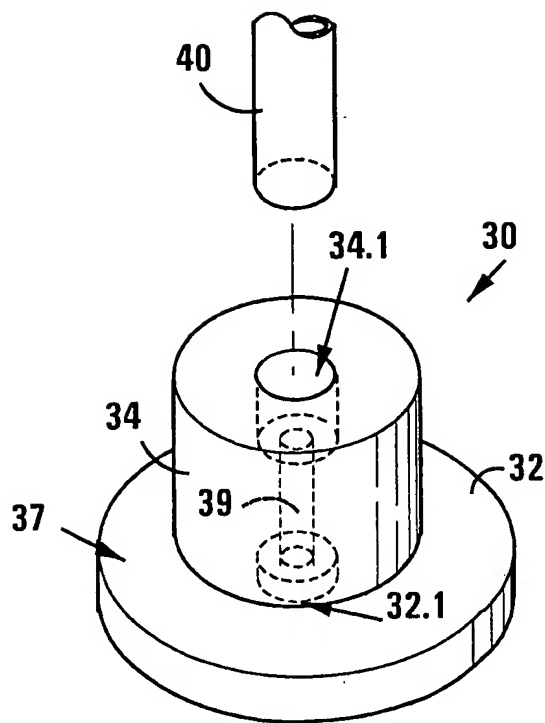


FIG 2

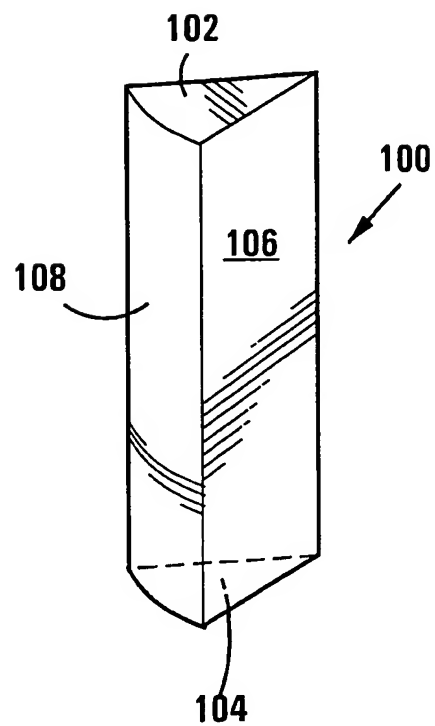


FIG 4

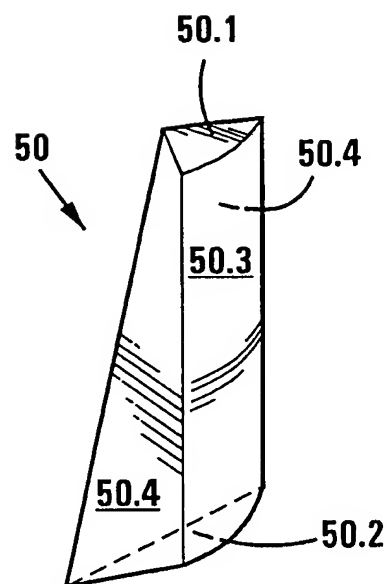
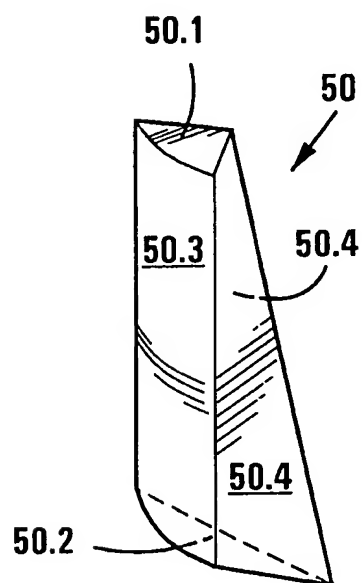


FIG 3

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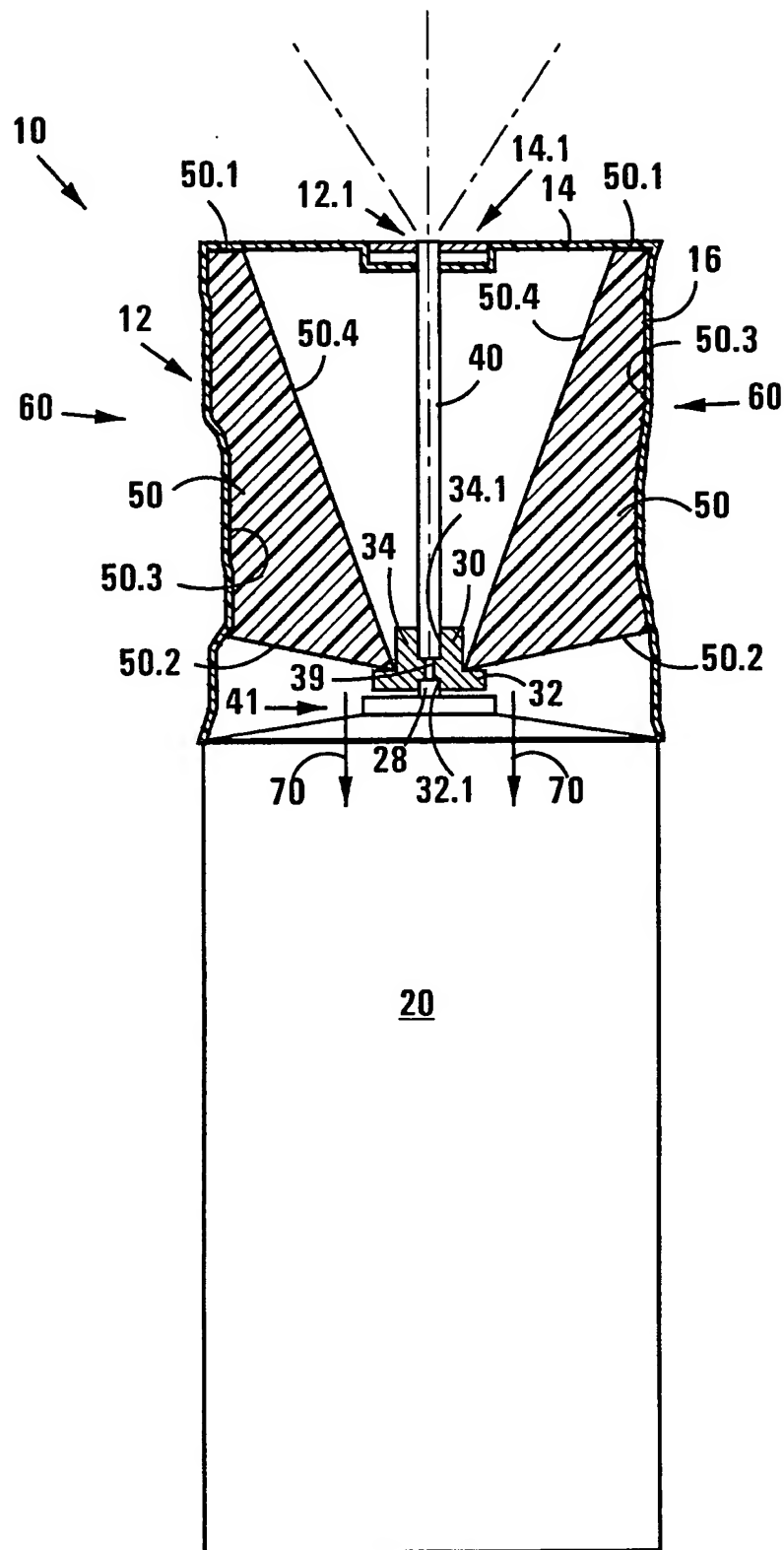


FIG 5

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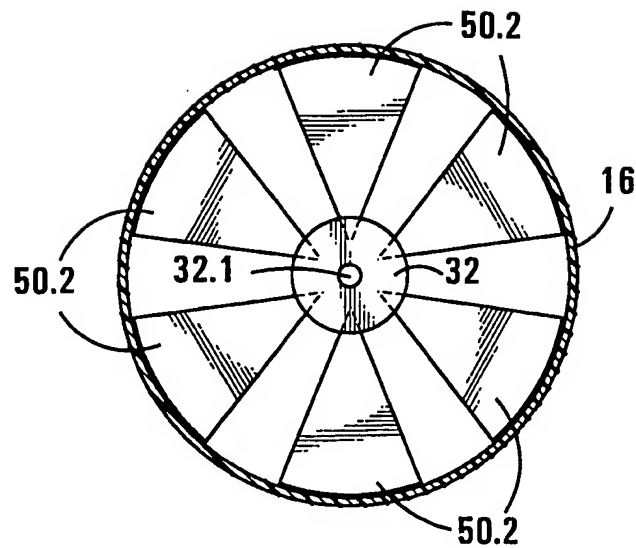


FIG 6

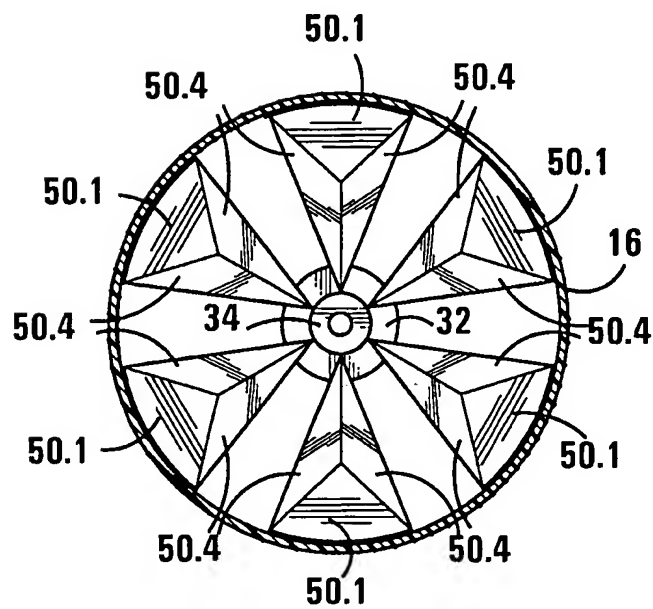


FIG 7

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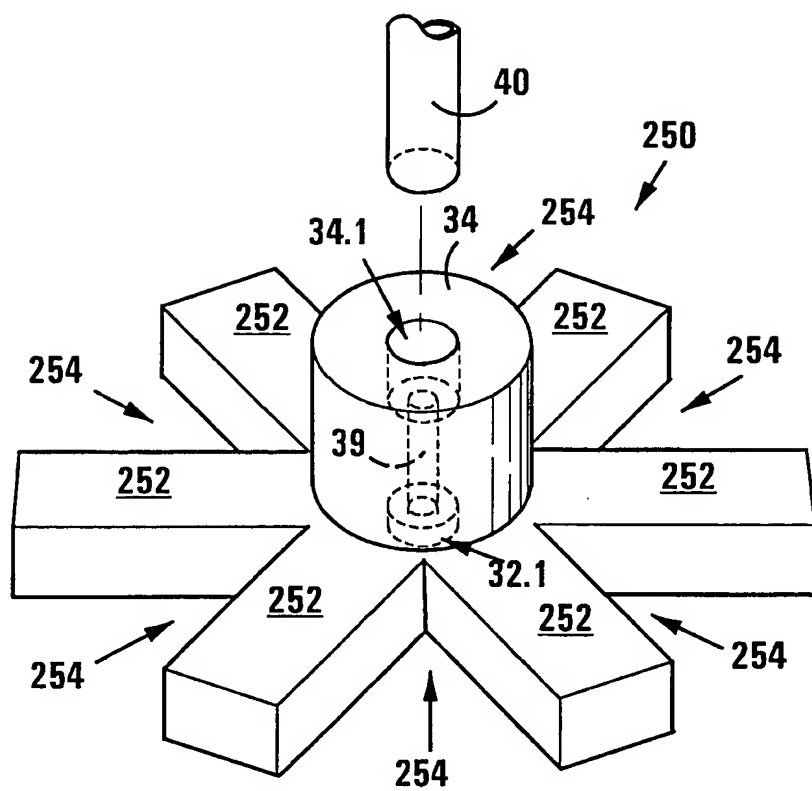


FIG 9

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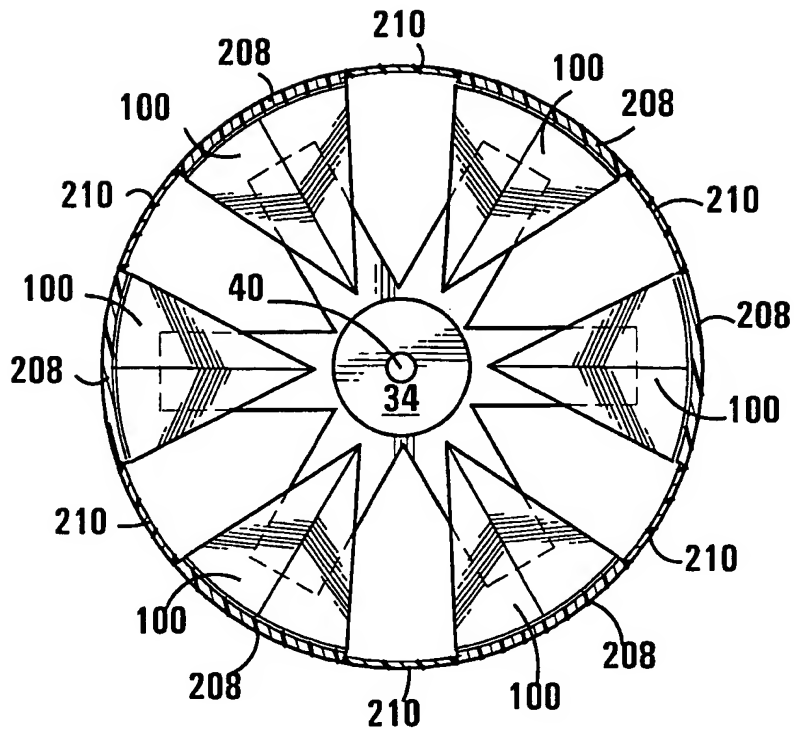


FIG 10

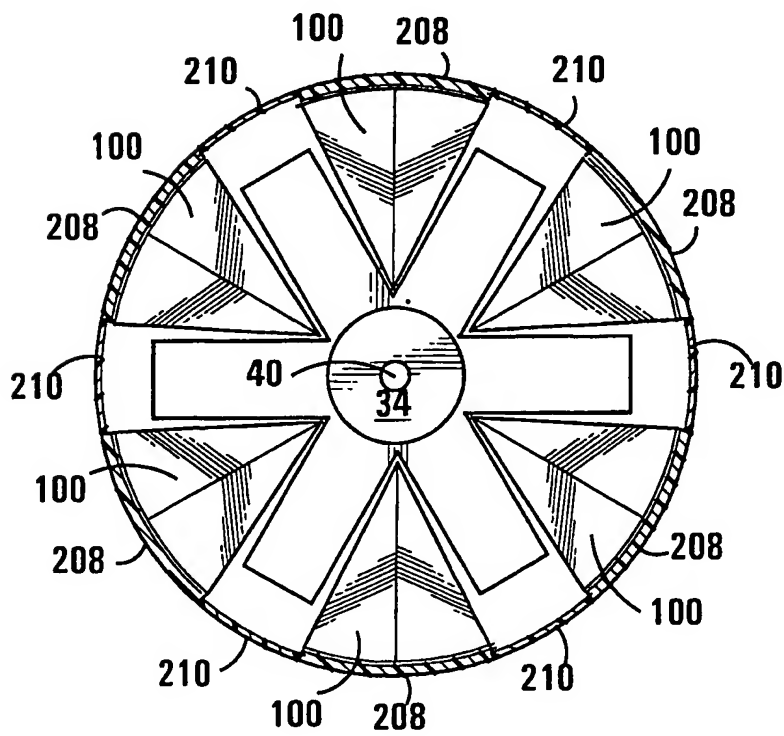


FIG 11

INTERNATIONAL SEARCH REPORT

Internal¹ Application No

PCT/IB 00/01405

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B65D83/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| | --- -/-- | |

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

International Application No

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